

**2016 Cobra Invitational**  
**Saturday, January 30, 2016**  
**Birmingham Covington School**

**REACH FOR THE STARS**

**School Name:** \_\_\_\_\_

**Team Number:** \_\_\_\_\_ **Team Color:** \_\_\_\_\_

**Student Names:** \_\_\_\_\_

Page 1:      Constellations Correct      \_\_\_\_\_ X 5 = \_\_\_\_\_ possible 30 pts  
                 Stars/Deep Sky objects      \_\_\_\_\_ X 2 = \_\_\_\_\_ possible 16 pts

Page 2:      Constellations Correct      \_\_\_\_\_ X 5 = \_\_\_\_\_ possible 35 pts  
                 Stars/Deep Sky objects      \_\_\_\_\_ X 2 = \_\_\_\_\_ possible 12 pts

Page 3:      Correct Answers      \_\_\_\_\_ X 2 = \_\_\_\_\_ possible 36 pts

Page 4:      Correct Answers      \_\_\_\_\_ X 2 = \_\_\_\_\_ possible 12 pts

Page 5:      Correct Matches      \_\_\_\_\_ X 3 = \_\_\_\_\_ possible 30 pts

Page 6:      Correct True/False      \_\_\_\_\_ X 2 = \_\_\_\_\_ possible 24 pts

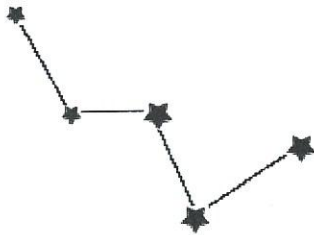
TOTAL      \_\_\_\_\_ possible 195 pts

**TIE BREAKER #1 Correct?**

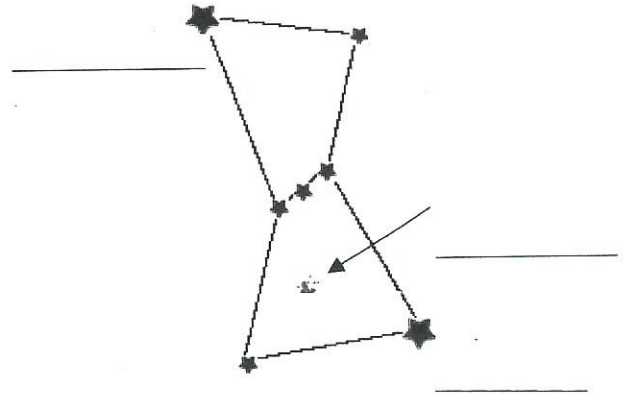
**TIE BREAKER #2 Correct?**

**TIE BREAKER #3 Correct?**

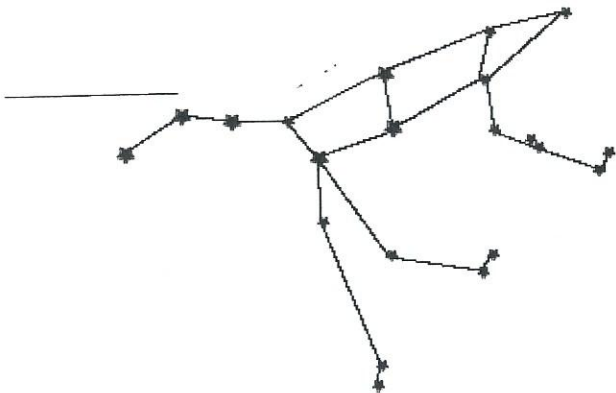
PART 1: Identify the following Constellations and fill in the blanks (stars or deep sky objects). 5 points for each constellation identified correctly and 2 points for each star or deep sky object correctly labeled.



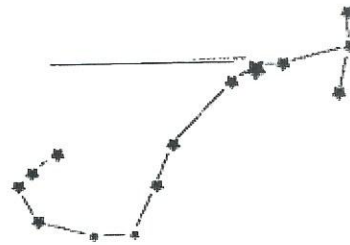
Constellation Name: \_\_\_\_\_



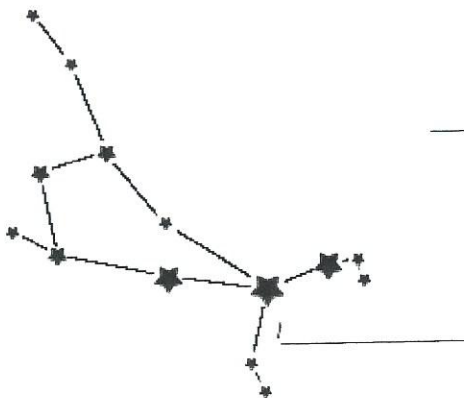
Constellation Name: \_\_\_\_\_



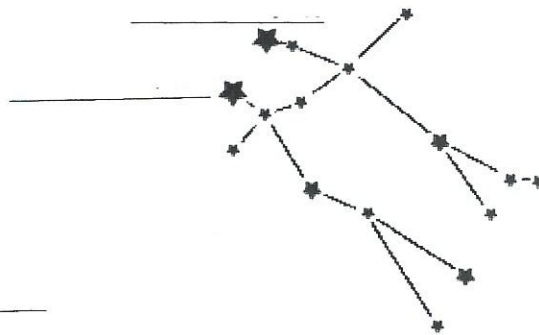
Constellation Name: \_\_\_\_\_



Constellation Name: \_\_\_\_\_



Constellation Name: \_\_\_\_\_



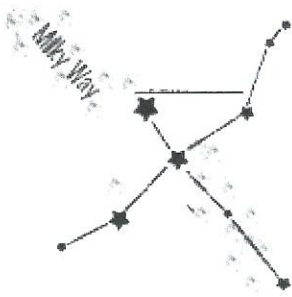
Constellation Name: \_\_\_\_\_

Constellations correct possible 6

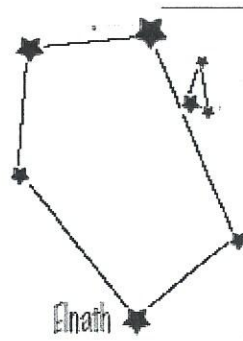
\_\_\_\_\_ x 5 =

stars/deep sky objects possible 8

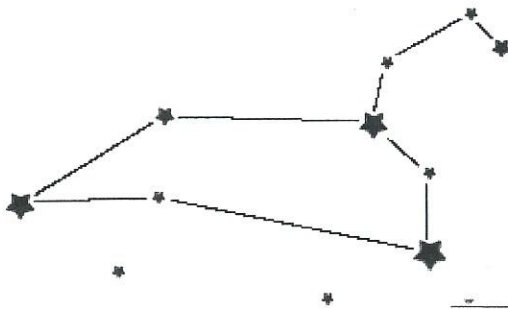
\_\_\_\_\_ x 2 =



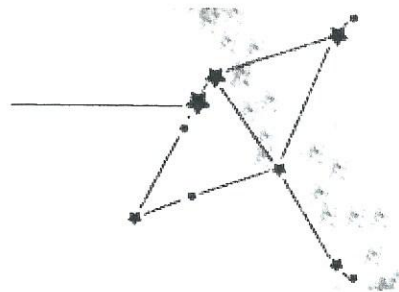
Constellation Name: \_\_\_\_\_



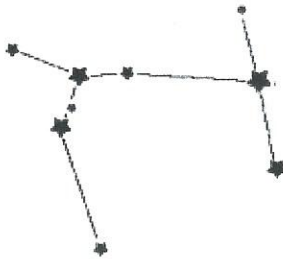
Constellation Name: \_\_\_\_\_



Constellation Name: \_\_\_\_\_



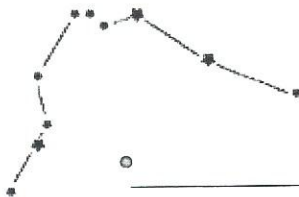
Constellation Name: \_\_\_\_\_



Constellation Name: \_\_\_\_\_



Constellation Name: \_\_\_\_\_



Constellation Name: \_\_\_\_\_

Constellations correct possible 7

\_\_\_\_\_ x 5 =

stars/deepsky objects possible 6

\_\_\_\_\_ x 2 =

PART 2:

1/ Complete the missing phases in the life cycle of an average star. (2 points each)

Average Star → \_\_\_\_\_ → \_\_\_\_\_ → \_\_\_\_\_

2/ Complete the missing phases in the life cycle of a massive star. (2 points each)

Massive Star → \_\_\_\_\_ → \_\_\_\_\_ ↗  
 ↘ \_\_\_\_\_

3/ Identify the following Star's Spectral Class: (2 points each)

### ***Spectral Class Characteristics***

Spectral Class	Intrinsic Color	Surface Temperature (K)	Prominent Absorption Lines
O	Blue	41,000	He <sup>+</sup> , O <sup>+</sup> , N <sup>+</sup> , Si <sup>+</sup> , He, H
B	Blue	31,000	He, H, O <sup>+</sup> , C <sup>+</sup> , N <sup>+</sup> , Si <sup>+</sup>
A	Blue-white	9,500	H(strongest), Ca <sup>+</sup> , Mg <sup>+</sup> , Fe <sup>+</sup>
F	White	7,240	H(weaker), Ca <sup>+</sup> , ionized metals
G	Yellow-white	5,920	H(weaker), Ca <sup>+</sup> , ionized & neutral metal
K	Orange	5,300	Ca <sup>+</sup> (strongest), neutral metals strong, H(weak)
M	Red	3,850	Strong neutral atoms, TiO

Star	Spectral Class	Star	Spectral Class
Aldebaran	_____	Rigel	_____
Antares	_____	Sirius	_____
Arcturus	_____	Spica	_____
Betelgeuse	_____	Sun	_____
Capella	_____	Vega	_____
Procyon	_____		

4/ Place the following stars/deep sky objects on the H-R Diagram. (2 points each)

A – Sirius B – a white dwarf with luminosity of  $0.03L$  and Spectral Class A.

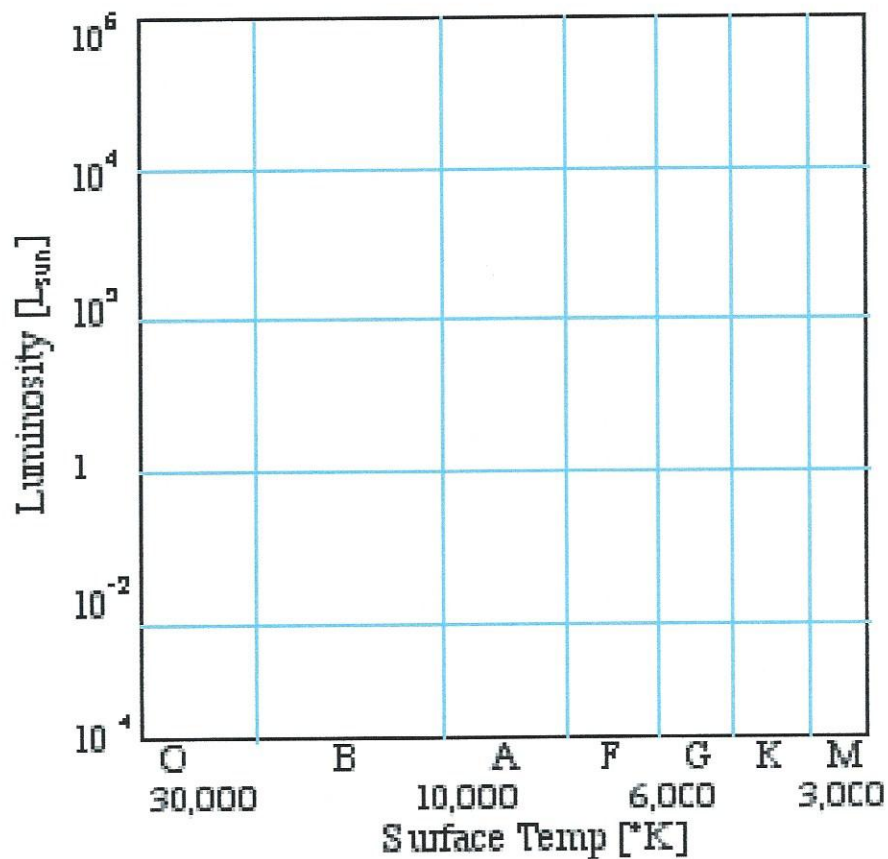
B – Deneb – Brightest star in the constellation Cygnus. Spectral type A2 with luminosity of  $196,000L$

C – Sun – The star at the center of our solar system. Spectral Class G with luminosity of  $1L$

D – Altair – Brightest star of the Eagle. Spectral Class A with luminosity of  $10.6L$

E – Rigel – A blue giant with surface temperature of  $11,000\text{ Kelvin}$  and luminosity of  $66,000L$

F – Gamma Crucis – Nearest red giant to the Sun, Spectral Class M and luminosity of  $1,500L$



Name: \_\_\_\_\_

**Question 5 (3 points each)**

Write the letter of the correct match next to each problem.

- |     |                           |   |
|-----|---------------------------|---|
| 1.  | _____ Gamma Ray           | a. the distance which a ray of light would travel in one year.  |
| 2.  | _____ Light Year          | b. the brightness of a star as seen from earth  |
| 3.  | _____ Neutron Star        | c. Extremely short-wavelength and energetic electromagnetic radiation.  |
| 4.  | _____ Supernova           | d. The remnants of a dead star.   |
| 5.  | _____ main sequence       | e. total amount of energy emitted by a star, galaxy, or other astronomical object per unit time                           |
| 6.  | _____ absolute brightness | f. patterns of stars  |
| 7.  | _____ apparent brightness | g. a diagonal area on an H-R diagram that includes more than 90 percent of all stars                                      |
| 8.  | _____ constellation       | h. developing star not yet hot enough to engage in nuclear fusion   |
| 9.  | _____ protostar           | i. a star that suddenly increases greatly in brightness because of a catastrophic explosion that ejects most of its mass. |
| 10. | _____ luminosity          | j. the brightness a star would have if it were at a standard distance from earth  |

6/ True/False – Indicate whether each statement is true (T) or false (F). 2 points each.

\_\_\_\_\_ Supergiants are brighter than giants.

\_\_\_\_\_ White Dwarfs are colder than red supergiants.

\_\_\_\_\_ Star temperatures are measured in Celsius on an H-R Diagram.

\_\_\_\_\_ All giant stars are red.

\_\_\_\_\_ The **distance modulus** is the difference between the apparent magnitude (ideally, corrected from the effects of interstellar absorption) and the absolute magnitude of an astronomical object.

\_\_\_\_\_ Stars are deep sky objects.

\_\_\_\_\_ White Dwarf Stars are part of the main sequence on an H-R Diagram.

\_\_\_\_\_ Stars are always evolving.

\_\_\_\_\_ A Nebulae is a cloud of dust and gases.

\_\_\_\_\_ Helix Nebula is a deep sky object part of the constellation Aquarius.

\_\_\_\_\_ Blue Dwarf Stars have a higher Luminosity than Blue Supergiant Stars.

\_\_\_\_\_ The **electromagnetic spectrum** describes all the wavelengths of light.